[redacted]

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

AMO DEVELOPMENT, LLC, AMO MANUFACTURING USA, LLC and AMO SALES AND SERVICE, INC.,

Plaintiffs,

v.

ALCON LENSX, INC., ALCON VISION, LLC, ALCON LABORATORIES, INC. and ALCON RESEARCH, LLC,

Defendants.

ALCON INC., ALCON LENSX, INC., ALCON RESEARCH, LLC, and ALCON VISION, LLC,

Counter-Plaintiffs,

v.

AMO DEVELOPMENT, LLC, AMO MANUFACTURING USA, LLC AMO SALES AND SERVICE, INC., and JOHNSON & JOHNSON SURGICAL VISION, INC.

Counter-Defendants.

PUBLIC REDACTED VERSION

C.A. No. 20-842 (CFC)

[redacted]

EXPERT DECLARATION OF DR. DOUGLAS SCHMIDT IN SUPPORT OF PLAINTIFFS' MOTION FOR A PRELIMINARY INJUNCTION

[redacted]

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[redacted]

I. INTRODUCTION AND ASSIGNMENT

I, Douglas Schmidt, declare that:

1. I have been retained as an expert in this case by AMO Development, LLC, AMO Manufacturing USA, LLC and AMO Sales and Service, Inc. (collectively, "J&J Vision").

2. I understand that J&J Vision has asserted copyright infringement claims against Alcon LenSx, Inc., Alcon Vision, LLC, Alcon Laboratories, Inc., and Alcon Research, LLC (collectively, "Alcon") in this matter.

3. J&J Vision asked me to review the source code for the computer program that operates J&J Vision's IntraLase FS Model 2 and Model 3 Laser systems and iFS® Advanced Femtosecond Laser systems (collectively, "iFS"), used for refractive surgery, and determine whether J&J Vision developers had to exercise discretion, judgment, and choice when designing and implementing that program. I have also been asked to identify the individuals who are listed as "authors" of the iFS source code as specified in the iFS source code's internal developer's annotations or "comments."

4. J&J Vision has also asked me to examine the source code for certain versions of the computer program that operates Alcon's LenSx Laser system ("LenSx"), to evaluate whether the LenSx computer program was copied from

[redacted]

and/or was based upon the iFS computer program, and if so, to evaluate the extent and importance of the replicated material.

5. I understand that the iFS laser system was first developed by a company named IntraLase Corp., which was later acquired by a company named Advanced Medical Optics, Inc.[1] Advanced Medical Optics, Inc. was later acquired by Abbott Laboratories, and renamed as Abbott Medical Optics Inc.[2] Abbott Medical Optics Inc. was later acquired by Johnson & Johnson.[3] For simplicity in this declaration, unless otherwise specified, I refer to the developer of iFS as J&J Vision.

6. I understand that the LenSx laser system was first developed by a company called LenSx Lasers, Inc., which was later acquired by Alcon.[4] For simplicity in this declaration, unless otherwise specified, I refer to the developer of LenSx as Alcon.

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[1] Press Release, Advanced Medical Optics to Acquire IntraLase Corp. (Jan. 8, 2007), https://www.sec.gov/Archives/edgar/data/1163848/000119312507004587/dex991.htm; Homer Decl. at Exs. 1–5.

[2] Press Release, Abbott Laboratories to Buy Advanced Medical Optics, Inc. for $1.4 Billion in Eye-Care Deal (Jan. 12, 2009), https://www.biospace.com/article/releases/abbott-laboratories-to-buy-advanced-medical-optics-inc-for-1-4-billion-in-eye-care-deal-/; Homer Decl. at Ex. 6.

[3] Press Release, Johnson & Johnson Completes Acquisition of Abbott Medical Optics (Feb. 27, 2017), https://www.jnj.com/media-center/press-releases/johnson-johnson-completes-acquisition-of-abbott-medical-optics; Homer Decl. at Exs. 8–10, 12.

[4] D.I. 25 ¶ 80.

[redacted]

II. SUMMARY OF OPINIONS

7. Based on the available information, my opinions are as follows:

A. J&J Vision developers exercised discretion and choice in designing and writing the iFS computer program

8. The iFS computer program is a sophisticated program [redacted]. A program of this complexity required the developers to fashion a thoughtful approach to design and implementation to perform sophisticated laser operations on human eyes with an extremely high level of reliability and precision.

9. The iFS computer program could have been designed and written in many different ways to meet the required functionality of the program, and the J&J Vision developers exercised discretion and made numerous choices among those options. For example, they used their discretion and judgment to develop the particular organization, structure, data flow, and implementing modules in iFS.

B. The LenSx computer program is based on, and copies substantial code from, the iFS computer program

10. Because of time constraints, and because finding and examining the precise similarities in the iFS and LenSx codebases is a time-intensive exercise, my examination to date has been somewhat limited.[5] But even that limited examination

[5] As my review continues, based on what I have already seen, I fully expect to see even more evidence of copying by Alcon. I reserve the right to update, supplement, or otherwise modify my opinions as the case proceeds, as I review

[redacted]

has led me to conclude that the LenSx computer program is based on J&J Vision's iFS computer program, and iFS code still functions at the heart of the LenSx program today. As explained in more detail below, Alcon copied [redacted]

more code, and as additional information comes to light through the course of discovery.

[redacted].[6] Based on my experience, this level of similarity [redacted] is not mere coincidence but strongly indicates copying. [redacted] Indeed, *later* versions of iFS (which were developed after the iFS code appears to have been taken to LenSx Lasers, Inc.) made major modifications to the iFS file structure.[7]

11. Alcon's copying extended into the heart of the source code.[8] For example, in the figure below, the code on the left is from J&J Vision's iFS program, and the code on the right is from Alcon's LenSx program:[9]

[6] *See* ¶¶ 93–95, *infra*.

[7] *See* ¶¶ 72–75, 94, *infra*.

[8] *See generally* Appendix C.

[9] The demonstrative excerpts of Alcon's code in this declaration and attached **Appendix C** have been retyped from the paper copies produced by Alcon to improve readability and reflect how the code appears electronically. In certain cases, the excerpts were formatted to "line up" identical segments. I have provided the Bates-numbered citations to the paper copies of code produced by Alcon.

[redacted]

[redacted]

12. Even a cursory examination of these excerpts reveals clear evidence of copying. ***First***, the implementing code itself is virtually identical and performs the routine in exactly the same way and order. ***Second***, [redacted]. ***Third***, the descriptive comments documenting the steps performed by the code are identical, down to the odd spacing and capitalization. [redacted]

[redacted]

[redacted]

10 [redacted]

[redacted]

13. The above excerpt is just one example. It covers about 60 lines of code from a single file. **Appendix C** contains ***36 pages*** of side-by-side images showing verbatim or nearly verbatim copying by Alcon, which I elaborate on in the body of my declaration below.[13] Those 36 pages of examples total over 1,500 lines of copied code across eleven iFS source code files. I have not performed a comprehensive analysis of the amount or scale of copying, nor have I documented every single instance of copying I have observed in my inspections so far. Moreover, any analysis of identical lines of code would not reflect the full scope of Alcon's copying, as it would not account for small changes that Alcon made to the code, like changes to parameter names, that I have observed in my inspection of the code. Indeed, I have observed that the developers of the LenSx code made many superficial changes to the iFS code, such as changing function or parameter names.[14]

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[11] [redacted]

[12] [redacted]

[13] *See* ¶¶ 99–180, *infra*.

[14] [redacted]

[redacted]

14. Although I have not performed a comprehensive analysis of all of the line-for-line similarity of the source code for the iFS program and the LenSx program, I have closely examined a select number of files and observed numerous functions, data structures, and other code in the LenSx program that are 100% identical, or very nearly identical, to functions, data structures, and other code in the iFS program. As discussed in greater detail below, that examination revealed several categories of highly unusual similarities and characteristics:

- The LenSx source code contains dates ***before*** LenSx Lasers, Inc. was founded in 2008,[15] and when I understand several of its developers were at AMO Development LLC's predecessors, IntraLase Corp. and/or Advanced Medical Optics, Inc.
- The very first version number of the produced LenSx code is [redacted] an unconventional version number for a brand-new computer program. Instead of starting with version 1.00 (which would be typical), the Alcon developers seem to have continued to use the versioning scheme already established in iFS.[16]

[redacted]

[15] *See, e.g.*, ¶¶ 101, 105, 169, and 175–177, *infra*.

[16] *See, e.g.*, ¶¶ 82–84, 87, *infra*.

[redacted]

- [redacted] wholesale from the iFS code, [redacted]
- The LenSx code also contains implementing functions copied wholesale from the iFS code that are **not** relied on by other parts of the LenSx program. Instead, they appear to be merely artifacts that serve no purpose in the LenSx program, but reveal the true origins of the LenSx program.[18]
- The LenSx code contains developer comments identical to comments in the iFS code.[19] J&J Vision developers exercised discretion and choice in designing and drafting those comments to ensure that later developers could more easily understand the executable source code.
- The copied comments also include the same misspellings, unusual spacing, and non-standard capitalization, all of which strongly suggests that the code was copied and pasted wholesale from electronic source code files.[20]
- [redacted]

[17] *See, e.g.*, ¶¶ 99–166, *infra*.

[18] *See, e.g.*, ¶¶ 150–155, 168–171, 177–179, *infra*.

[19] *See, e.g.*, ¶¶ 104–105, 107, 111–113, 116–120, 122–124, 126, 128–129, 131, 134–135, 138, 140, 142–143, 158–162, *infra*.

[20] *See, e.g.*, ¶¶ 107, 160, 162, 175, 178, *infra*.

[redacted].[21]

15. Alcon's copying was not limited to ancillary functionality. Instead, much of it is critical to the functioning of the LenSx laser system. [redacted] as mentioned above, [redacted] in iFS.[23] Simply put, the LenSx computer program—and therefore the LenSx laser system itself—would not operate without the content copied from iFS.

[21] *See* ¶¶ 169–171, *infra*.

[22] *See* ¶¶ 144–149, *infra*.

[23] *See* ¶¶ 93–98, *infra*.

[redacted]

C. Alcon appears to have made changes to obscure its copying

16. Moreover, comparing earlier and later versions of the LenSx computer program code suggests that the Alcon developers, over time, tried to remove references that reflected that the code was copied from iFS. For example, a change in one LenSx file merely modified the listed date of the file in the header from [redacted] to [redacted]—the original date of [redacted] is particularly notable because, again, I understand that LenSx Lasers, Inc. did not even exist at that time.[24]

D. Alcon's copying saved it significant development time

17. Copying the [redacted] from the iFS computer program saved LenSx significant development and testing time and effort that would have otherwise been required to plan, design, create, and test a new codebase from scratch.[25] LenSx's use of the iFS code as a base from which to build its cataract surgical operations enabled it to skip the development effort that would have otherwise been required to develop and test a femtosecond laser that made accurate and safe cuts, likely saving years of development time.

E. Alcon would have to rewrite its code essentially from scratch to remove all vestiges of content copied from iFS

18. In my opinion, based on the materials I have examined so far, [redacted] that Alcon took from iFS to develop the LenSx computer

[24] *See* ¶¶ 174–176, *infra*.

[25] *See* ¶¶ 76–77, *infra*.

[redacted]

program is inseparable from the features that Alcon modified or added. Even if one could fully identify and conceptually separate the iFS code from the code later added by Alcon, Alcon's code is so intertwined with the copied aspects of iFS that it would be next to impossible to separate them, like conjoined twins that share a single heart.

19. Given Alcon's copying of the [redacted]

[redacted]

LenSx laser system, it is my opinion that Alcon would have to rebuild its codebase essentially from scratch, such as via a clean-room implementation, to fully remove the elements it copied from the iFS computer program, including the overall organization of the program.[26]

III. QUALIFICATIONS

20. I am the Cornelius Vanderbilt Professor of Engineering in the Department of Electrical Engineering and Computer Science at Vanderbilt University in Nashville, TN, where I also serve as the Associate Provost for Research Development and Technologies and the co-Director of the Data Science Institute. My research spans a broad range of software systems, including distributed object computing, middleware platforms, real-time operating systems, and distributed real-time and embedded systems. I became a Full Professor with tenure at Vanderbilt University in January 2003.

[26] *See* ¶¶ 90–91, *infra*.

[redacted]

21. I have been a full-time university professor since 1994. I was previously a tenured professor at the University of California, Irvine in the Electrical and Computer Engineering department, from 2000 to 2003, and before that at Washington University in St. Louis, MO in the Computer Science and Engineering department and the Mallinckrodt Institute of Radiology, from 1994 to 1999. In addition, I served as the Chief Technology Officer and Deputy Director for the Software Engineering Institute (SEI) at Carnegie Mellon University from 2010 to 2012, where I led the SEI's research, development, and operational efforts related to software engineering and cyber-security.

22. I received my Doctor of Philosophy (Ph.D.) degree in Computer Science from the University of California (UC) Irvine in Irvine, CA in 1994. I also earned a Master's Degree in Computer Science from UC Irvine in 1990, as well as a Bachelor's Degree in Sociology in 1984 and Master's Degree in Sociology in 1986 from the College of William and Mary in Williamsburg, VA. I first started programming in 1983 when I was an undergraduate student taking statistics courses. From 1985 through 1994 I learned how to program in Pascal, C, C++, Ada, Prolog, and Lisp, both at the College of William and Mary and at UC Irvine. A copy of my *curriculum vitae* is attached as **Appendix A** to this declaration.

23. For the past three decades, my research has focused on distributed real-time and embedded (DRE) systems, which has yielded the ACE, Java ACE, TAO,

[redacted]

and CIAO middleware frameworks. The millions of lines of object-oriented code in these frameworks provide layers of infrastructure and distribution middleware that simplify the development of concurrent and networked software apps and services. These middleware frameworks constitute some of the most successful examples of software research and development (R&D) ever transitioned from research to industry, being widely used by thousands of companies and agencies worldwide in many domains, including national defense and homeland security, datacom/telecom, financial services, healthcare, and online gaming.

24. For example, my ACE and TAO middleware frameworks have been applied in a wide range of medical modalities (such as CT, CR, and MR) at Siemens, Philips, GE Healthcare, and Kodak Health Imaging Systems. I have also published peer-reviewed papers that empirically evaluate the throughput, latency, and scalability of my ACE and TAO middleware frameworks in the context of popular jitter of my ACE and TAO middleware in the context of popular real-time operating systems, including QNX, LynxOS, VxWorks, and Linux/RT. In addition, I am a co-inventor on U.S. Patent No. 7,523,471 with members of Siemens Medical Engineering, which applied my open-source ACE software to their Syngo medical device product line starting in the mid-1990s.

25. My research on DRE systems has been funded by various organizations, including both federal agencies, such as Defense Advanced Research

[redacted]

Project Agency (DARPA), National Science Foundation (NSF), NASA, NIH, the U.S. Air Force, and the U.S. Navy, as well as leading companies, such as Northrup Grumman, Raytheon, Lockheed-Martin, Boeing, McDonnell-Douglas, General Electric, Siemens Medical Engineering, and Kodak Health Imaging Systems. I have also received other honors and awards, including election to professional organizations, engagements for invited talks, and the 2015 Award for Excellence in Teaching from the Vanderbilt University Department of Electrical Engineering.

26. In addition, during my stint as a program manager at DARPA from 2000 to 2003, I led the national research and development effort on resilient networking and middleware software for DRE systems, which focused on the systematic use of adaptation, supported by redundancy, heterogeneity, and use of computer network security mechanisms. During this time, I also co-chaired the Software Design and Productivity (SDP) Coordinating Group of the U.S. government's multi-agency Networking and Information Technology Research and Development (NITRD) Program, which helped formulate the national interagency software research agenda.

27. Besides my academic and research experience, from 2010 to 2014, I served as a member of the United States Air Force Scientific Advisory Board (SAB), where I was the Vice Chair of the SAB's Cyber Situational Awareness study, which conducted a comprehensive review of the U.S. Air Force's tactics, techniques, and

[redacted]

procedures related to secure network-centric mission operations. I have also served on the Advisory Board for the U.S. Naval Air Systems Command (NavAir) Future Airborne Capability Environment (FACE) and was a co-lead of a task force on "Published Open Interfaces and Standards" for the U.S. Navy's Open Systems Architecture initiative.

28. For over 30 years, I have conducted and supervised many research projects involving a wide range of software-related topics, including patterns, optimization techniques, and empirical analyses of communication protocol stacks, web servers, and object-oriented middleware frameworks for distributed real-time embedded systems and mobile-/web-based cloud computing applications. I have published 650+ scholarly articles and technical papers, and I am the co-author/editor of 10+ books or book-length manuscripts on various topics, including software architecture, network programming, object-oriented frameworks, distributed and real-time systems, open-source middleware platforms, and web-/mobile-based cloud computing applications. My expertise in real-time operating systems and real-time embedded systems qualifies me to perform the type of analysis required in this case.

29. My work has been cited 42,500+ times across a comprehensive spectrum of high-impact publications, and my current h-index[27] score is 84, which

[27] The h-index is a popular measure of scholarly productivity. The definition of the index is that a scholar with an index of h has published h papers each of which has

[redacted]

reflects the impact of my publications on scholarly literature in the field of computer science. I have also supervised the research of more than 40 PhD and Master's graduate students to date. Together with conducting and publishing my own research, I have served on the editorial board of many journals, including publications by IEEE and the ACM, and I have been a guest editor of many special issue journals based on my research expertise.

30. On top of my research experience, I have decades of hands-on programming experience with a variety of different programming languages. I began programming with C in 1985 and have programmed with object-oriented languages since 1986, when I began to program with C++. I have programmed with Java and other related object-oriented languages since the mid-1990s and early 2000s. Starting in 1991, while at the University of California Irvine, I led the development of one of the first C++ object-oriented frameworks for concurrent and networked middleware and applications (ACE). Starting in 1996, I developed one of the first Java object-oriented frameworks for concurrent and networked middleware and applications (Java ACE).

31. Since 1990, I have taught more than 2,000 students in dozens of face-to-face courses on network programming to both undergraduate and graduate

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been cited in other papers at least h times. Thus, the h-index reflects both the number of publications and the number of citations per publication.

[redacted]

students at UC Irvine, Washington University in St. Louis, and Vanderbilt University. Since 2013, I have taught mobile cloud computing to more than 400,000 students in online courses, including Massive Open Online Courses (MOOCs) on the Coursera platform, which have focused on technologies like mobile app programming with Android, Java, and JavaScript, as well as cloud service programming with various web services frameworks, such as Spring and Node.js.

32. Together with my regular course offerings, over the past 30 years I have also taught 600+ short-courses and tutorials on many subjects, including: object-oriented design patterns and programming techniques; systems programming and network programming for UNIX and Windows; object-oriented and functional programming languages; concurrent and parallel programming in Java and Android; and various courses on distributed systems, real-time and embedded systems, TCP/IP, web apps, and services, compiler construction, algorithms, and data structures.

33. I am being compensated at my usual rate of $550 per hour. My compensation is not contingent on my testimony, opinions, or the outcome of this case.

[redacted]

IV. BACKGROUND

A. Legal Framework

34. I am not an attorney or legal expert, and I have not been asked to provide legal opinions. I have been informed by counsel for J&J Vision of certain basic principles of law relevant to my technical expert opinions, which are set forth below.

35. I understand that original computer programs can be protected by copyright, and that those protections can extend to source code written by a developer, including the comments; the structure, sequence, and organization of the code; and the object code after the code has been compiled.

36. I understand a computer program is "original" if the program was independently created (as opposed to being copied from other works) and possesses at least some minimal degree of creativity. I understand that "creativity" here can be demonstrated where the computer program code could have been designed and written in a number of different ways, and that the developer exercised creative choice in how they wrote the source code for that computer program.

37. I understand that the owner of a copyright has the exclusive rights to engage in a number of activities with respect to the copyrighted work. Specifically, I understand that the owner has the exclusive rights to reproduce the copyrighted

[redacted]

work and to prepare "derivative works" based upon the copyrighted work, such as by making modifications or adaptations of the copyrighted work.

38. I understand that someone who violates any of the exclusive rights of a copyright owner, such as by engaging in any of the activities above without permission from the copyright owner, is an infringer of the copyright. I understand that proving copyright infringement requires a showing, among other things, that the work was entitled to copyright protection, that the defendant, as a factual matter, copied from the work, and that the defendants' accused work is substantially similar to the original.

B. Technical Background

1. Computer Programming Principles

39. Computer programming languages, like C and Java, enable software developers (also known as programmers) to write files containing lines of source code. Source code is software that is typically written or read by human developers.

40. Source code with consistent and correct syntax can ultimately be converted into instructions that direct computing devices to perform specific actions. A developer typically writes a program using multiple files, each containing many lines of source code. The lines of source code in those files are then converted by a compiler (through a process known as "compiling") into machine instructions that tell the computer running the program what to do. Those instructions are sometimes

[redacted]

called "object code." When a software-enabled computer or other device or machine is manufactured and distributed to customers, it commonly includes only the compiled object code, not the source code.

41. In addition, developers typically include annotations, known as "comments," in the source code that make the code easier for humans to understand. A source code file also typically includes a "header" that provides basic information about the file, including the names of the developers, the date of its creation, and the revision history of the file (e.g., what sorts of changes were made on certain dates).

42. A program that has been compiled into object code generally exists in a format that the computer can understand but is hard for humans to decipher. The exact format of a compiled program will depend on the language in which the program was written and the compiler(s) used to translate the program into machine instructions. A compiled program, when examined, may refer to certain parameter or function names, but a programmer would be unable to determine the contents of the source code solely by looking at the compiled program.

43. One of the most important parts of developing any computer program is organizing the various modules, functions, and data in the program. A well-written and efficient computer program will strategically use the principle of abstraction to make different "levels" of computation, each level calling on a function the next level down to execute a more detailed set of instructions. A good

[redacted]

program should also have carefully designed data structures that contain the information that must be conveyed at the right level of abstraction.

44. An "embedded system" generally refers to a special computing system dedicated to performing functions to operate some type of product or system with real-time operating and computing restraints. Embedded systems are generally used in applications requiring high reliability and stability of performance. Many modern products contain embedded systems or subsystems, including cars (e.g., electronic traction control systems), aircraft avionics, and medical devices (e.g., dialysis or ultrasound machines).

45. An operating system (OS) is infrastructure software that operates of a computing device. An OS directs the processing of systems programs and application programs by allocating and releasing resources (such as storage space in main memory), scheduling access to hardware components (such as processor cores and frame buffers), and managing input and output devices (such persistent files and network interfaces).

46. A real-time operating system (RTOS) is an OS that guarantees events or data are processed within a designated time frame. A defining characteristic of a RTOS (versus a general-purpose OS) is its degree of consistency related to the amount of time (i.e., latency)—and variation of that time (i.e., jitter)—needed to accept and perform system and application tasks. An RTOS is typically used in

[redacted]

embedded systems to guide interactions with physical elements (such as sensors and actuators) in domains (such as robotic surgery, avionics, or process control systems) where the right answer delivered too late becomes the wrong answer. Examples of RTOS include QNX, VxWorks, and RTLinux.[28]

47. QNX is a multi-threaded RTOS whose micro-kernel architecture that uses message passing as a fundamental means for inter-process communication (IPC). QNX supports preemptive priority-based first-in first-out (FIFO) scheduling of threads. It also supports various synchronizers that coordinate interactions among threads, including semaphores that implement a priority inheritance protocol.

48. Application software—like the software that operates the iFS and LenSx systems—is typically written to run on a particular operating system. Application software written to run on an RTOS—like most application software—is typically created using an incremental and iterative development model, where the first version (or "baseline") that is released contains features designed to meet the

[28] *See, e.g.*, Levine, Flores-Gaitan, & Schmidt, "Measuring OS Support for Real-time CORBA ORBs," Proceedings of the Fourth International IEEE Workshop on Object-oriented Real-time Dependable Systems (WORDS'99), Santa Barbara, California, January 27–29, 1999; Levine, Schmidt, & Flores-Gaitan, "An Empirical Evaluation of OS Support for Real-time CORBA Object Request Brokers," Proceedings of the Multimedia Computing and Networking 2000 (MMCN00) conference, ACM, San Jose, CA, January 25–27, 2000; Schmidt, Deshpande, & O'Ryan, "Operating System Performance in Support of Real-time Middleware," the 7th IEEE Workshop on Object-oriented Real-time Dependable Systems, San Diego, CA, January, 2002.

[redacted]

initial set of requirements. Over later iterations, new versions of the software are released that incrementally build upon and enhance previous versions, e.g., by providing new features and functionality, fixes for defects in previous versions, adaptations to new hardware and software platforms, and improvements to various quality attributes (such as performance, memory utilization, scalability, reliability, and security). Each subsequent version of software that is released contains more changes and enhancements relative to previous versions.

49. Writing code for any computer program requires the developers to make strategic decisions regarding how to implement the various functions the program is intended to do. These design decisions become even more important when designing and developing a computer program for an embedded system. Developers of programs for embedded systems must be aware of the capabilities and limitations of the various hardware modules in the system to ensure that they interact and operate smoothly, effectively, and reliably. Developers of such applications must consider the desired functionality of the program and any hardware constraints, develop a plan for organizing and implementing the modules to accomplish the goals of the system, determine the interrelationship between the modules and how they will communicate with one another, and then implement the modules themselves.

50. The steps outlined above often require the application of skill and ingenuity on the part of software developers. The developers' organization and

[redacted]

implementation decisions are particularly important when writing computer programs for embedded systems since writing efficient, robust, and predictable software for embedded system applications can affect the overall performance of the system or product itself.

2. Femtosecond Laser Systems

51. Both the iFS computer program and the LenSx computer program operate femtosecond lasers[29] intended for use in ophthalmic surgeries.[30] In this section I lay out my understanding of how femtosecond laser systems work.

52. I understand that femtosecond lasers use ultrafast laser pulses to create "bubbles" in eye tissue that, when combined, form a precise surgical effect and allow doctors to perform surgery on tissue below the surface of the eye, including cataract surgery and LASIK surgery.[31] I also understand that, using a femtosecond laser system makes it "possible to create customized geometries and resection planes, depending on each individual clinical case, with an absolutely precise control that

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[29] A "femtosecond laser" is a laser that emits a series of pulses with an extremely short duration, on the order of femtoseconds (10^{-15} seconds). Gualdi & Gualdi, FEMTO-LASER CATARACT SURGERY (2014) at 9–10.

[30] *See iFS® Advanced Femtosecond Laser*, JOHNSON & JOHNSON VISION, https://www.jnjvisionpro.com/products/ifs%C2%AE-advanced-femtosecond-laser (last visited Feb. 2, 2021); *Take the First Step in Creating Reproducible Outcomes with the LenSx® Laser*, ALCON, https://professional.myalcon.com/cataract-surgery/cataract-equipment/lensx-laser-system/ (last visited Feb. 2, 2021).

[31] Gualdi & Gualdi, FEMTO-LASER CATARACT SURGERY (2014) at 10; D.I. 16 ¶¶ 58, 64.

[redacted]

only a computer can provide," which proved to be "a real revolution in the field of ophthalmic microsurgery."[32] I understand that these systems generally include components to make three-dimensional incisions and cutting patterns.[33]

V. MATERIALS REVIEWED

53. A list of the materials I have considered in connection with this declaration is attached as **Appendix B**. I have reviewed the Declaration of Mr. Biren Mehta, and the Declaration of Ms. Carolyn Homer, along with the applicable attached exhibits. I have also reviewed all materials cited in this declaration.

54. I received a laptop computer for accessing source code provided by both J&J Vision and Alcon ("Source Code Laptop"), and instructions for accessing the source code through the Source Code Laptop. I could access and review the source code on the Source Code Laptop starting on November 23, 2020.

55. In preparing this declaration, I considered the operative pleadings relating to the copyright claims in this case (D.I. 16 and 25). I also considered certain Operator's Manuals for the products at issue in this matter: 1) a document titled "IntraLase FS Laser Operator's Manual," with a copyright date of 2006,[34] and 2) a

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[32] Gualdi & Gualdi, FEMTO-LASER CATARACT SURGERY (2014) at 11.

[33] Sun *et al.*, "Femtosecond-Laser-Assisted Cataract Surgery (FLACS)," High Resolution Imaging in Microscopy and Ophthalmology (2019), https://doi.org/10.1007/978-3-030-16638-0_14, at 305.

[34] Homer Decl. at Ex. 25.

[redacted]

document titled "LenSx Laser System Operator's Manual," with a revision date of November 20, 2018 (D.I. 21-2).

56. The content of this declaration, and my opinions expressed, are necessarily limited by the information available for review. I have not yet reviewed all documents and information that I would expect to see and review in a case of this technical complexity, including, but not limited to, *e.g.*, architecture and design documents, verification and validation documents, revision notes, and fact testimony from the developers. I understand that the parties voluntarily provided their source code to each other before discovery began. Because fully investigating and documenting the many similarities in the iFS and LenSx codebases is a time-intensive endeavor, I have not yet had the time to fully explore and document all of the similarities in the code available to me. I further understand that additional relevant code and other documents may be produced later. I reserve the right to revise my opinions as discovery proceeds and my investigation continues. I further reserve the right to supplement my opinions, including in response to additional information and code reviewed, discovery provided by the parties, new information and opinions provided by Alcon's expert(s), decisions made by the court in which this action is pending, or decisions by other courts.

[redacted]

VI. THE IFS SOURCE CODE

57. The iFS computer program operates the iFS Advanced Femtosecond Laser, a surgical laser used to create precise incisions for several ophthalmic procedures.[35] Earlier versions of the same program were used to operate earlier models of the same laser system, called the IntraLase FS Model 2 and Model 3 Laser systems.[36] For ease of reference, in this declaration, I refer to all models of this laser system as the "iFS laser" and the computer program for those models as the "iFS computer program" or "iFS."

A. iFS Versions

58. J&J Vision has registered copyrights for the following versions of the iFS computer program.[37] Each registered version of the iFS computer program corresponds to a folder containing source code on the Source Code Laptop as shown in the following table:

[35] *iFS® Advanced Femtosecond Laser*, JOHNSON & JOHNSON VISION, https://www.jnjvisionpro.com/products/ifs%C2%AE-advanced-femtosecond-laser (last visited Feb. 2, 2021).

[36] D.I. 16-1 at Exs. Q–AA.

[37] D.I. 16-1 at Exs. Q–HH.

[redacted]

Version	Month/Year Published[38]	Copyright Reg. No.	Source Code Folder
1.00	Apr. 2004	TX 8-892-568	[redacted]
1.01	June 2004	TX 8-892-570	
1.02	Aug. 2004	TX 8-892-579	
1.03	Oct. 2004	TX 8-892-616	
1.04	Feb. 2005	TX 8-892-571	
1.05	Jun. 2005	TX 8-892-576	
1.06	Nov. 2005	TX 8-892-583	
1.07	Dec. 2005	TX 8-892-582	
1.08	Mar. 2006	TX 8-892-586	
1.10	Nov. 2006	TX 8-892-565	
1.12	Jul. 2007	TX 8-892-585	
2.02	Jan. 2009	TX 8-892-564	
2.04	Apr. 2010	TX 8-892-567	
2.20	Oct. 2011	TX 8-892-618	
2.30	Mar. 2012	TX 8-892-614	
2.50	Dec. 2013	TX 8-892-580	
2.60	Oct. 2014	TX 8-892-621	
2.70	Aug. 2016	TX 8-892-612	

[38] Publication dates as reflected in the registration certificates. D.I. 16-1 at Exs. Q–HH.

[redacted]

59. I confirmed that the Source Code Laptop contained all the registered versions of iFS by looking at the version information in the source code itself. [redacted]

60. [redacted]

61. In general, unless otherwise specified, when I refer to the iFS computer program below, I am referring to the iFS code registered as version 2.02, [redacted] I have focused my examination on iFS version 2.02 because it approximates the state of the iFS source code at the time of the departure of the developers who later joined Alcon or its predecessors. I understand that Mr. Goldstein joined LenSx Lasers, Inc. in 2008,

[redacted]

[redacted]

and Mr. Vardin joined LenSx Lasers, Inc. in 2009.[40] I further understand that Mr. Hegedus joined Alcon or its predecessors after contributing to the iFS code.[41] The copyright registration for iFS version 2.02 indicates that it was published around January 2009,[42] and would have likely incorporated changes made to the codebase between approximately July 2007 (the date of release of the previous version of iFS, version 1.12)[43] and approximately January 2009. I have reviewed the source code files in iFS version 2.02, which indicate that Mr. Goldstein and Mr. Vardin made changes to the codebase throughout 2008.[44] There may be an intermediate or

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[40] D.I. 16 at ¶ 95; Homer Decl. at Exs. 22–23.

[41] *See* D.I. 25-4 (patent filed May 18, 2011 and assigned to Alcon LenSx, Inc., listing Imre Hegedus as an inventor).

[42] D.I. 16-1 at Ex. BB.

[43] D.I. 16-1 at Ex. AA.

[44] [redacted]

see also Mehta Decl. at ¶¶ 7–8.

[redacted]

development version of the iFS code between registered version 2.02 and the next registered version, 2.04, that exhibits closer similarities to the LenSx code. For example, Mr. Goldstein or Mr. Vardin could have developed new features that were not integrated into the released iFS codebase until version 2.04 but were part of a development version of the iFS code that was taken out of J&J Vision and carried to Alcon. I reserve the right to revise or supplement my analysis as my investigation continues and discovery continues in this case.

B. Contributors to the iFS Computer Program

62. My examination of the various versions of the iFS code confirms that the iFS computer program evolved over time, as is typical with any computer program. As part of that evolution, it appears that different individuals created and modified the various iFS source code files between version 1.00 and version 2.02. In general, the source code files in the iFS codebase contain comments that include an "AUTHOR:" line that reflects the individuals who wrote, modified, or otherwise contributed to that particular file.[45]

63. The comments in iFS 2.02 source code files themselves indicate[46] that the individuals who developed and/or revised the source code files in iFS version

[45] Mehta Decl. ¶¶ 7–8; [redacted]

[46] I understand that the developers of the iFS code would use their initials to designate the individuals who contributed to a given source code file. For

[redacted]

2.02 were Peter Goldstein, Imre Hegedus, Kostadin Vardin, Biren Mehta, and "R. Duff."[47] I understand "R. Duff" likely refers to Rick Duff, who signed an employment agreement with Advanced Medical Optics, Inc. in 2008.[48]

64. I understand that Peter Goldstein, Biren Mehta, Kostadin Vardin, Imre Hegedus, and Rick Duff were each subject to various agreements with IntraLase Corp. and/or Advanced Medical Optics, Inc. at the relevant times during the development of these versions of the iFS code.[49] I generally understand that each developer assigned his intellectual property rights associated with the development of the iFS program to IntraLase Corp. and/or Advanced Medical Optics, Inc.[50] Thus, the source code, along with the supporting documents I have reviewed, indicate that

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example, "PG" or "P. Goldstein" would have referred to Peter Goldstein. Mehta Decl. ¶¶ 7–8.

[47] *See* Mehta Decl. ¶¶ 5–8; [redacted]

[48] [redacted]

[49] Mehta Decl. ¶¶ 6, 10; Homer Decl. at Exs. 13–15, 17–21, 23–24.

[50] *See* Mehta Decl. ¶ 10.

[redacted]

IntraLase Corp. or Advanced Medical Optics, Inc. personnel developed and improved the iFS 2.02 program in-house.

C. Aspects of the iFS Computer Program Reflecting The Exercise of Discretion and Choice

65. The iFS computer program required its developers to apply programming skill, discretion, and judgment to create an effective product that is usable by surgeons and provides the extremely high levels of reliability and safety for patients.[51] The fact that the iFS computer program operates a medical laser in no way eliminates the need for the developers of the computer program to apply skill and imagination to achieve the desired functionality. Implementing a computer program of the size, complexity, and importance of the iFS computer program is non-trivial. Developers of computer programs like iFS must make important decisions about how to structure, organize, and optimize the program to perform the desired operations while optimizing the computing resources required for such operations.[52] Organization and management of the code and the computing resources are particularly important for computer programs running medical devices since an error or even a pause in the anticipated operation of the product could impact the procedure being performed on a patient. Writing code that is easy for later

[51] Mehta Decl. ¶ 9.

[52] *See id.*

[redacted]

developers to understand, debug and maintain requires thoughtful advance planning and design. Indeed, writing simple, readable code often requires more ingenuity than writing complex code.

66. In my examination of the iFS computer program, including the state of the program at version 2.02, I found that J&J Vision developers exercised significant discretion and choice in implementing the various ophthalmic procedures the laser performs.

67. [redacted]

[redacted]

53 [redacted]

54 [redacted]

[redacted]

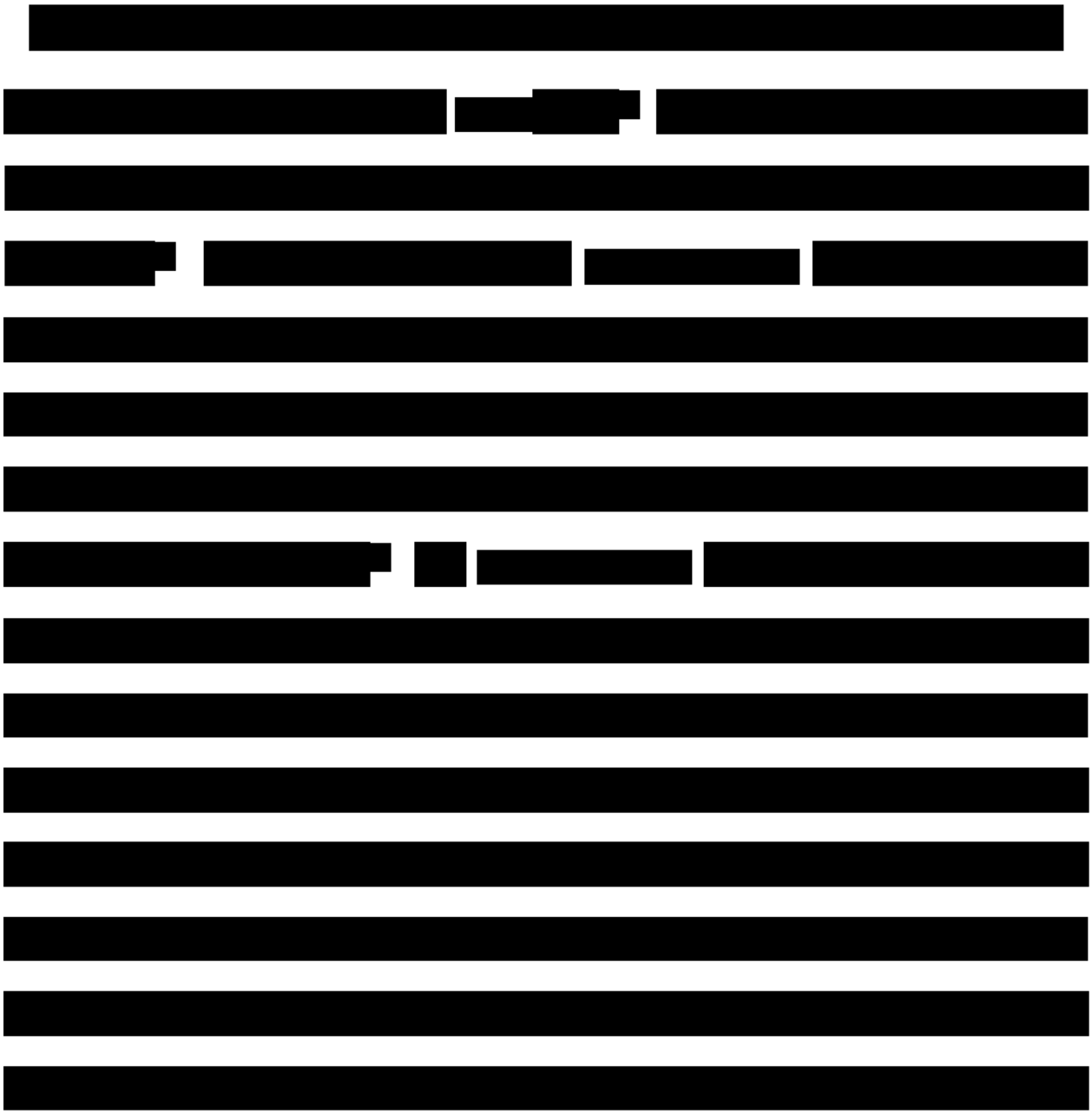
68. [redacted]

[redacted]

[redacted]

69. [redacted]

[redacted]



[redacted]

70. The developers of the iFS computer program could have implemented this code in many ways. [redacted] Indeed, previous versions of iFS lacked this [redacted] code entirely.[63] [redacted] There are many other examples of imaginative implementing source code in iFS, which I discuss below in describing code copied from iFS into LenSx.[64]

[redacted]

[64] *See* ¶¶ 103–143, 158–165, *infra*.

[redacted]

71. Moreover, the iFS code contains substantial in-code documentation in the "comments," which are non-executable explanations and annotations written in prose and not in any programming language that programmers add into source code files to help make the source code easier to understand. The developers of the iFS code chose whether comments should be included at all, where comments should be located within the source code file, and what the comments should say. [redacted]

72. In addition, the J&J Vision developers made structural and organizational choices that have a unique expression in their implementation. [redacted]

[redacted]

[redacted]

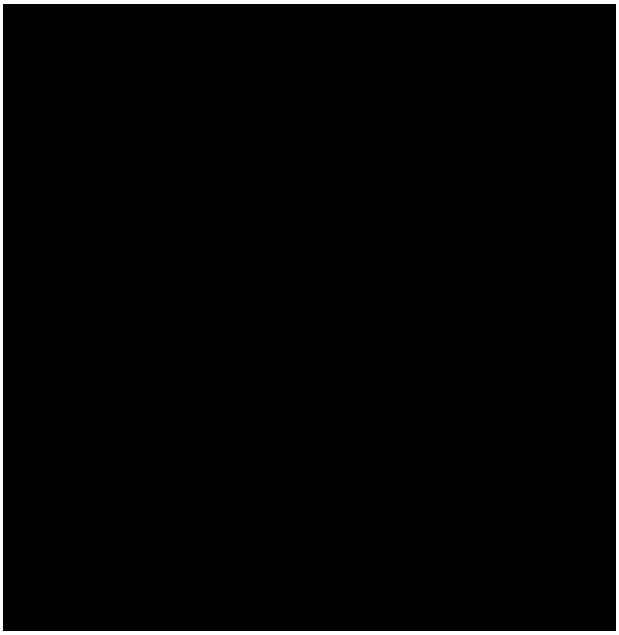
[redacted] Those decisions to arrange the components of the program in this manner reflects the exercise of discretion and judgment. [redacted] That arrangement of the code also reflected a deliberate choice by the developers.

73. The following image shows the basic file structure of iFS version 1.00, [redacted]

[redacted]

[redacted]

74. Developers of later versions of the iFS computer program [redacted] significantly revised the arrangement of the various components that make up the codebase. The following is a screenshot of the first-level directory structure in the most recent version of the iFS computer program (version 2.70):



[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

75. Although I understand iFS 1.00 and iFS 2.70 were both developed for the same sets of hardware, were both written in the same programming language, contain much of the same implementing code, and were both intended to run on the same RTOS, these directory structures are very different. [redacted] While there is no one best way to design and organize a given computer program, the evolution of the file structure of the iFS computer program over time shows that a great amount of discretion, judgment, and choice went into the arrangement and architecture of even the original version of iFS.

76. Stepping back, developing the iFS computer program took a significant amount of developer effort. In my experience, writing a computer program of this scope and complexity would have involved drafting requirement specifications, developing a preliminary design specification and architecture, designing detailed implementing architecture and methods, creating test plans to verify the program meets the specified requirements, writing the implementing code, testing and validating the implementing code according to the test plans, maintaining and improving the code based on observed issues and customer feedback, and documenting the development effort at each stage described above.[69] This

[69] *See* Mehta Decl. ¶ 9.

[redacted]

development process would be iterative, with each version having to go through the same (or highly similar) process.

77. Judging by the dates in previous versions of the iFS code, it took at least five years to develop the iFS program into the state in which it existed in version 2.02.[70] By comparison, I understand that LenSx Lasers, Inc. was founded in 2008, and it received FDA clearances for the LenSx laser system in 2009.[71]

VII. THE LENSX SOURCE CODE

78. The LenSx computer program operates the Alcon LenSx laser system, a femtosecond laser system designed for cataract surgery and other surgeries, including corneal surgeries.[72] The Alcon LenSx laser system would not operate without the LenSx computer program.

79. I note at the outset that although J&J Vision could have observed some indications of copying by examining the compiled LenSx object code installed on a delivered LenSx laser system,[73] J&J Vision could not have determined the true

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[70] [redacted]; *see also* Mehta Decl. ¶ 7.

[71] D.I. 25 ¶¶ 79, 97.

[72] *Take the First Step in Creating Reproducible Outcomes with the LenSx® Laser*, ALCON, https://professional.myalcon.com/cataract-surgery/cataract-equipment/lensx-laser-system/ (last visited Feb. 2, 2021).

[73] *See* D.I. 16 ¶ 98.

[redacted]

extent of the copying without comparing the iFS source code directly to the LenSx source code. Only an analysis of the nonpublic source code could reveal the full extent of the copying, including (but not limited to) [redacted] that I have identified in my preliminary analysis, as discussed below.

80. [redacted]

81. [redacted]

[redacted]

[redacted]

82. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

83. [redacted]

84. [redacted]

85. [redacted]

[redacted]

[redacted]

86. [redacted]

87. [redacted]

[redacted]

[redacted]

88. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

A. The current version of the LenSx software is based on J&J Vision's iFS code

89. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

90. As explained below, my examination revealed that Alcon adapted J&J Vision's iFS software to accomplish procedures specific to laser cataract surgery. In doing so, it replicated the [redacted] of J&J Vision's computer program, and incorporated substantial portions of J&J Vision's source code.

91. Removing these copied components is not a straightforward matter of deleting isolated fragments of code. [redacted]

[redacted]

from iFS for [redacted] Instead, it is my opinion that Alcon would have to rebuild its codebase essentially from scratch, such as via a clean-room implementation, in order to fully remove the copied components.

[redacted]

[redacted]

92. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

93. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

94. As discussed in paragraphs 72–75 above, [redacted] replicated from iFS is distinctive. [redacted]

[redacted]

[redacted]

and the files within iFS source code are unique, and there is no programming standard or practice that would require [redacted] implemented in the iFS code. Indeed, as noted, J&J Vision developers substantially reorganized the iFS code in later versions, establishing that the method of organizing the original iFS code stemmed from the exercise of the developers' discretion and choice.

95. The similarity of [redacted] of the iFS 2.02 and LenSx code is evident. In particular, there is a [redacted] and those within the iFS version 2.02.07. In my experience, the most logical explanation for the similarity [redacted] is substantial copying of iFS source code by the developers of the LenSx program.

96. Another [redacted] between the LenSx and iFS code involves [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

97. [redacted]

[redacted]

[redacted]

[redacted]

98. These are just some examples of how Alcon copied iFS's organization and structure, based on a preliminary examination of the code. With further examination, I will more comprehensively catalog the scope of such copying.

2. The code copied from iFS into LenSx is qualitatively important

99. I qualitatively analyzed a selection of source code files in LenSx [redacted] to assess the copied code's importance to LenSx program. I stress that the discussion in this section reflects only my observations regarding eighteen functions and five data structures across six files, covering approximately 1,500 lines of code. I did not have time to exhaustively document all the identical and similar code, even in the files I did analyze.[89]

[redacted]

89 [redacted]

[redacted]

100. It is clear from even my limited preliminary review that the LenSx program would not work without the code copied from iFS. Indeed, the copied code is critical to the operation and performance of the LenSx system. **Appendix C** to my declaration gives examples of the extent and breadth of the code copied; each of those examples is elaborated on below. Given volume of identical code I have observed in a short time thus far, I expect that added time and analysis will unearth many more instances where Alcon copied important source code from iFS.

i. [redacted]

101. A particularly striking example of copying is found in a file called [redacted] in the LenSx codebase.[90] This file is extremely similar, and in many places identical, to an iFS file called [redacted][91] To gain a sense for the scope of this copying, the iFS version of this file is attached at **Appendix D**, and the LenSx version of this file is attached at **Appendix E**. Even a cursory review of these Appendices side-by-side reveals obvious similarities. For example, in addition to the apparent visual similarities and identical content on the first page of Appendix D and the first page of Appendix E, both files contain the explanatory comment [redacted]

[redacted]

[redacted] apparently indicating [redacted] that an edit was made [redacted] before LenSx Lasers, Inc. was founded [redacted].[94]

102. Further, as explained below, the code copied from [redacted] system and the iFS laser system.[95] [redacted]

(a) [redacted]

(i) [redacted]

103. One example of a [redacted] copied from the iFS [redacted] file into the LenSx [redacted] file is [redacted] That function was copied verbatim—including all implementing code and explanatory comments—except for [redacted]

[redacted]

[redacted]

[redacted][97] The function's description is identical in both codebases, including the unusual capitalization: [redacted][98]

[redacted]

104. The [redacted] in LenSx is also a carbon copy of the same [redacted] in iFS,[99] including programmer comments describing [redacted]

[redacted][100].

[redacted]

[redacted]

105. One segment of the LenSx [redacted] code is particularly notable. The excerpts below show the code implementing [redacted] in both iFS and LenSx, as discussed in paragraph 69 above. The code is identical, including the text and inconsistent spacing of the explanatory comments:[101]

[redacted]

The first line in both excerpts above is significant since it appears to document the date of the implementation [redacted]

[redacted]

[redacted][102] [redacted] In fact, as noted, that [redacted] date ***predates the formation of LenSx Lasers, Inc. in 2008***.[105] Alcon copied this code from J&J Vision.

106. J&J Vision programmers could have designed and implemented the copied [redacted] function in many different ways. [redacted] Indeed, this code was not even present in the iFS code until version 2.02.[106] By taking version 2.02 of the iFS code (or a version of iFS near version 2.02), Alcon managed to gain the benefit of this improvement with no investment of time or effort on its part.

107. In addition, many explanatory comments in the LenSx [redacted] function are also character-for-character copies of comments in iFS. These copied

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[redacted]

[redacted]

comments provide unique descriptions of the associated code. They also serve as evidence of copying, as they include the same spelling errors and nonstandard spacing/punctuation, *e.g.*: [redacted] [107]

(ii) [redacted]

108. Another example of a function copied from the iFS [redacted] file into the LenSx [redacted] file is the function [redacted].[108] The function's description is identical in both codebases, including the unusual capitalization: [redacted] [109] [redacted] a majority of the implementing code is identical.[110]

[redacted]

[redacted]

109. J&J Vision programmers had to exercise judgment and choice in designing and implementing the copied [redacted] code. [redacted] This [redacted] could have been implemented in many different ways. For example, there is no requirement to [redacted] at all—in fact, previous versions of the iFS code lacked this feature.[112]

[redacted]

[redacted]

110. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

As another example, the method of [redacted] is also identical.[114]

111. In addition, the LenSx version of [redacted] includes copies of many programmer comments from iFS [redacted][115], all of which provide unique descriptions of the associated code.

(iii) [redacted]

112. Another example of a function copied from the iFS [redacted] file into the LenSx [redacted] file is the function [redacted].[116] That function was copied verbatim—including all implementing code and explanatory comments. The function's description in both codebases is identical, including the unusual capitalization: [redacted].[117] [redacted]

[redacted]

[redacted]

113. The code that [redacted] in LenSx is also copied verbatim from iFS,[118] including the comment descriptions [redacted][119]

114. J&J Vision programmers had to exercise judgment and choice in designing and implementing the copied [redacted]. [redacted]

[redacted]

[redacted]

115. [redacted]

116. In addition, the replicated programmer comments copied into the LenSx codebase [redacted]

[redacted]

[redacted] provide unique descriptions of the associated code.[123]

(iv) [redacted]

117. Yet another example of a function copied from the iFS [redacted] file into the LenSx [redacted] file is the function [redacted].[124] That function was copied verbatim—including all implementing code and explanatory comments. The function's description in both codebases is identical, including the unusual capitalization: [redacted][125]

118. J&J Vision programmers had to exercise judgment and choice in designing and implementing the copied the [redacted] function. [redacted]

[redacted]

[redacted]

[redacted][126] In addition, the programmer comments copied into the LenSx codebase [redacted] provide unique descriptions of the associated code.

(v) [redacted]

119. Still another example of a function copied from the iFS [redacted] file into the LenSx [redacted] file is the function [redacted].[128] That function was copied verbatim, including all implementing code and explanatory comments. The function's description in both codebases is identical, including the unusual capitalization: [redacted][129] [redacted]

[redacted]

[redacted]

120. Except for [redacted],[131] the code that [redacted] in LenSx is also copied verbatim from iFS,[132] including the comment descriptions of [redacted].[133]

121. J&J Vision programmers had to exercise judgment and choice in designing and implementing the copied [redacted]. [redacted]

[redacted]

[redacted]

122. In addition, the programmer comments copied into the LenSx codebase [redacted] provide unique descriptions of the associated code.[136]

(vi) [redacted]

123. Another example of a function copied from the iFS [redacted] file into the LenSx [redacted] file is the function [redacted].[137] That function was copied verbatim—including all implementing code and explanatory

[redacted]

[redacted]

comments. The function's description in both codebases is identical, including the unusual capitalization: [redacted].[138]

124. J&J Vision programmers had to exercise judgment and choice in designing and implementing the copied [redacted] code. [redacted] In addition, the programmer comments copied into the LenSx codebase [redacted] provide unique descriptions of the associated code.[140]

(vii) [redacted]

125. [redacted]

[redacted]

[redacted]

126. The [redacted] function was copied verbatim—including all implementing code and explanatory comments, including [redacted]

[redacted]

[redacted]

[redacted][143] The function's description in both codebases is identical:

[redacted][144]

127. [redacted]

128. The code that sets up the [redacted] in LenSx is also copied verbatim from iFS,[146] including the comment descriptions [redacted][147].

[redacted]

[redacted]

129. The [redacted] function is nearly copied verbatim from the iFS [redacted] file into the LenSx [redacted] file.[148] Except for [redacted], that function was copied verbatim—including implementing code and explanatory comments, including the explanation that the function will [redacted].[149] The function's description in both codebases is identical: [redacted].[150]

130. [redacted]

[redacted]

[redacted]

131. The [redacted] function was copied verbatim—including all implementing code and explanatory comments, including the explanation that [redacted][153] The function's description in both codebases is identical: [redacted].[154]

132. [redacted]

[redacted]

[redacted]

133. J&J Vision programmers had to exercise judgment and choice in designing and implementing the code that Alcon copied from the [redacted] For example, the [redacted] includes [redacted] Indeed, earlier versions of iFS did not

[redacted]

[redacted]

include [redacted].[159] Earlier versions of iFS also did not include code to [redacted].[160]

134. In addition, the programmer comments copied from these functions and structure into the LenSx codebase [redacted] provide unique descriptions of the associated code.[161]

(viii) [redacted]

135. Another example of a function copied from the iFS [redacted] file into the LenSx [redacted] file is the function [redacted].[162]

[redacted]

[redacted]

Except for [redacted], the function was copied verbatim—including all implementing code and the other explanatory comments.[163] The function's description in both codebases is identical: [redacted] and both sets of code state that this function implements [redacted].[164]

136. [redacted]

137. J&J Vision programmers had to exercise judgment and choice in designing and implementing the copied [redacted] code. [redacted]

[redacted]

[redacted]

138. In addition, the programmer comments copied into the LenSx codebase [redacted] provide unique descriptions of the associated code.[168]

(b) [redacted]

139. [redacted]

[redacted]

[redacted]

140. As one example from this file, the function [redacted] in the iFS [redacted] file is also present in the LenSx [redacted] file. The functions are almost identical, except for [redacted].[171] The function's description in both codebases is identical, including the unusual capitalization: [redacted].[172]

141. [redacted]

[redacted]

142. The code [redacted] in LenSx is copied verbatim from iFS, including the comment descriptions [redacted].[174]

143. J&J Vision programmers had to exercise judgment and choice in designing and implementing the copied [redacted] function and the [redacted] code. [redacted] In addition, the programmer comments copied into the LenSx codebase [redacted]

[redacted]

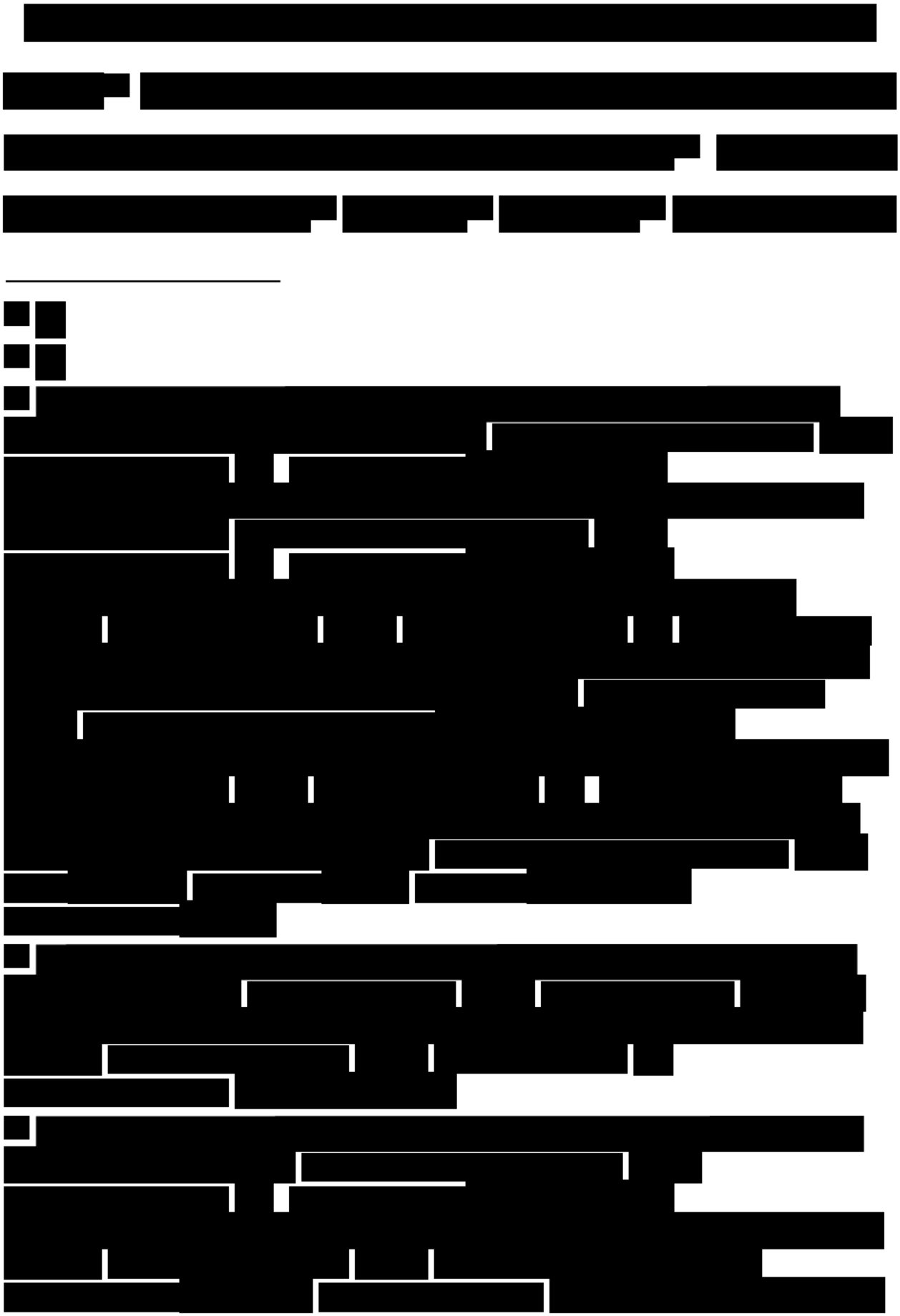
[redacted] provide unique descriptions of the associated code.[176]

[redacted]

144. [redacted]

[redacted]

[redacted]



[redacted]

146. [redacted]

[redacted]

[redacted]

[redacted]

147. [redacted]

148. [redacted]

[redacted]

[redacted]

149. [redacted]

[redacted]

[redacted]

[redacted]

(d) Copied functions and data structures that are not otherwise used by the LenSx program

150. In addition to iFS functions and data structures that were copied and *are used* by the LenSx system, there are a number of functions and data structures that were copied wholesale from iFS into LenSx but *are not otherwise used* by the LenSx computer program. Instead, this copied code appears to be mere vestigial artifacts that serve no functional purpose in the LenSx system, other than to reveal the true origins of the LenSx program being copied from the iFS program. Those artifacts makes the indiscriminate nature of Alcon's copying even more apparent.

151. For instance, unlike the other copied functions I discussed above, [redacted] function, even though it was copied [redacted]

152. Similarly, LenSx contains a file named [redacted] that contains a data structure, [redacted], which is very similar to a data structure, [redacted], in

[redacted]

[redacted]

iFS.[195] The table below demonstrates the similarities between parameter and parameter names contained in this data structure:[196]

[redacted]

153. However, as with the [redacted] function, LenSx does not actually use the [redacted] data structure anywhere else in the program.

[redacted]

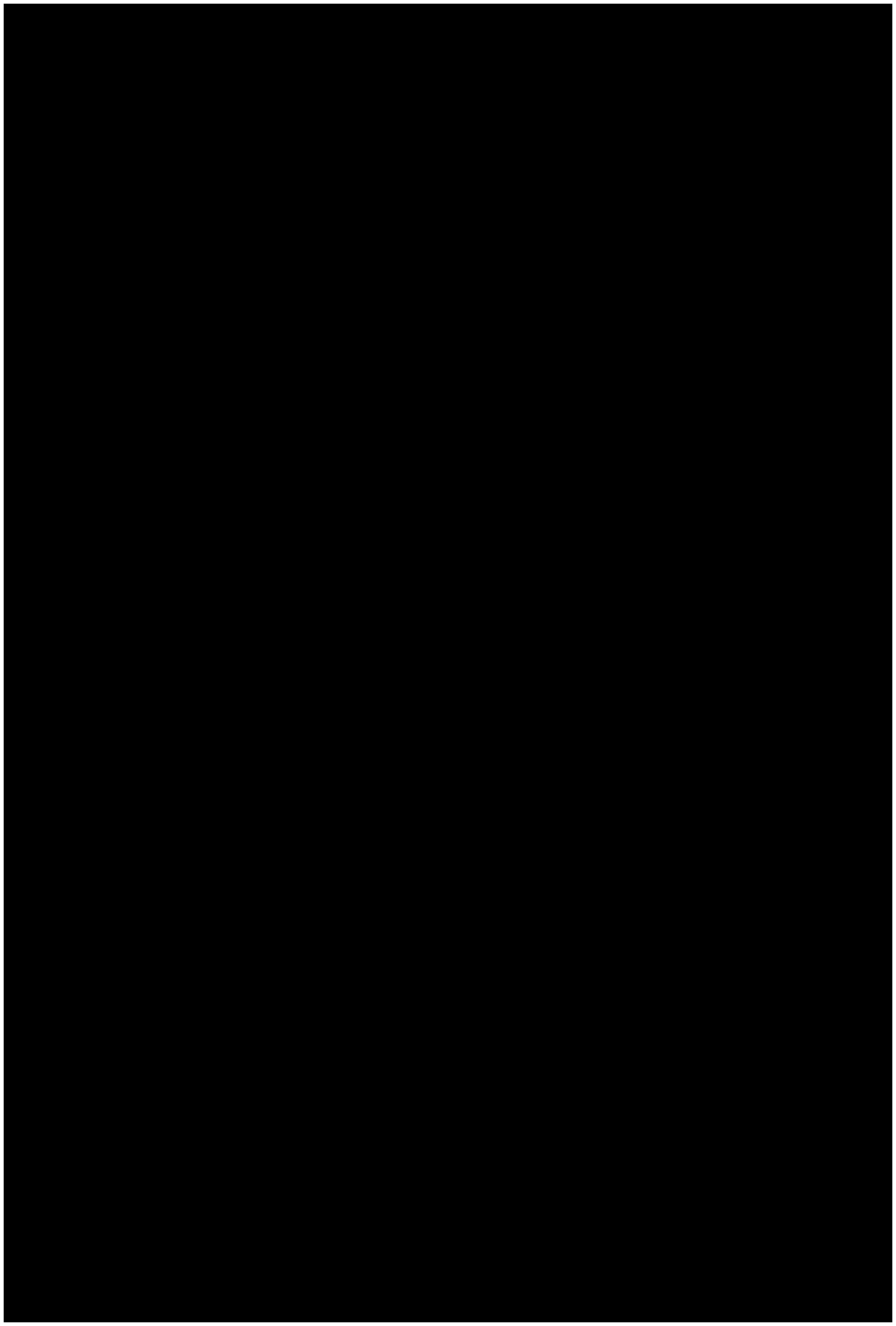
[redacted]

Again, the presence of this data structure serves as further evidence demonstrating that Alcon copied the iFS code indiscriminately but did not remove artifacts from iFS that LenSx did not need.

154. The function [redacted], found in both the iFS and LenSx code, is yet another artifact from iFS that is not actually used by the LenSx program.[197] The description for this function in both iFS and LenSx is identical: [redacted][198] The code defining the [redacted] is also the same.[199] The following excerpts demonstrate the similarity of the code:

[redacted]

[redacted]



155. LenSx does not actually use or call the [redacted] function anywhere in its code. The fact that LenSx still contains the same

[redacted] function as iFS is strong evidence indicating LenSx copied from iFS.

ii. [redacted]

156. Aside from the above examples of the LenSx using copied iFS code to build its [redacted] the LenSx computer program also copies iFS code for [redacted]

(a) [redacted]

157. For example, the LenSx file [redacted] contains code that is very similar to code found in the iFS file [redacted].[200] My initial review using the Beyond Compare software shows that these files do have some differences—[redacted] Upon closer inspection, however, the Alcon developers drew from the iFS code in creating [redacted]. The listed "author" of both files is [redacted], and the description of the file is identical, aside from the capitalization of the first word: [redacted][201] There are also numerous functions

[redacted]

[redacted]

that have been renamed or moved by Alcon, but are functionally identical or very close to identical, some of which are described below.

(i) [redacted]

158. For example, the function [redacted] in the LenSx [redacted] file is nearly identical to the function [redacted] in the iFS [redacted] file.[202] The descriptions of the functions are identical: [redacted].[203] The argument lists are also identical, including the definition of the parameter [redacted].[204] [redacted]

[redacted]

[redacted]

[redacted]

(ii) [redacted]

159. As another example, the function [redacted] in the LenSx [redacted] file has the same name and is nearly line-for-line identical to the same function in the iFS file [redacted], with the sole exception of [redacted]

[redacted]

[redacted] The function's description is identical in both codebases: [redacted].[210] The argument list is identical, including the definition of the parameter [redacted].[211] The explanatory comment in the implementation of the function is also identical and states: [redacted].[212] [redacted] The following table reveals the obvious similarity of the code and the explanatory comments:[214]

[redacted]

[redacted]

[redacted]

(iii) [redacted]

160. As yet another example, the function [redacted] in the LenSx [redacted] file has the same name and is nearly line-for-line identical to the same function in the iFS [redacted] file, with the sole exception of [redacted]

[redacted]

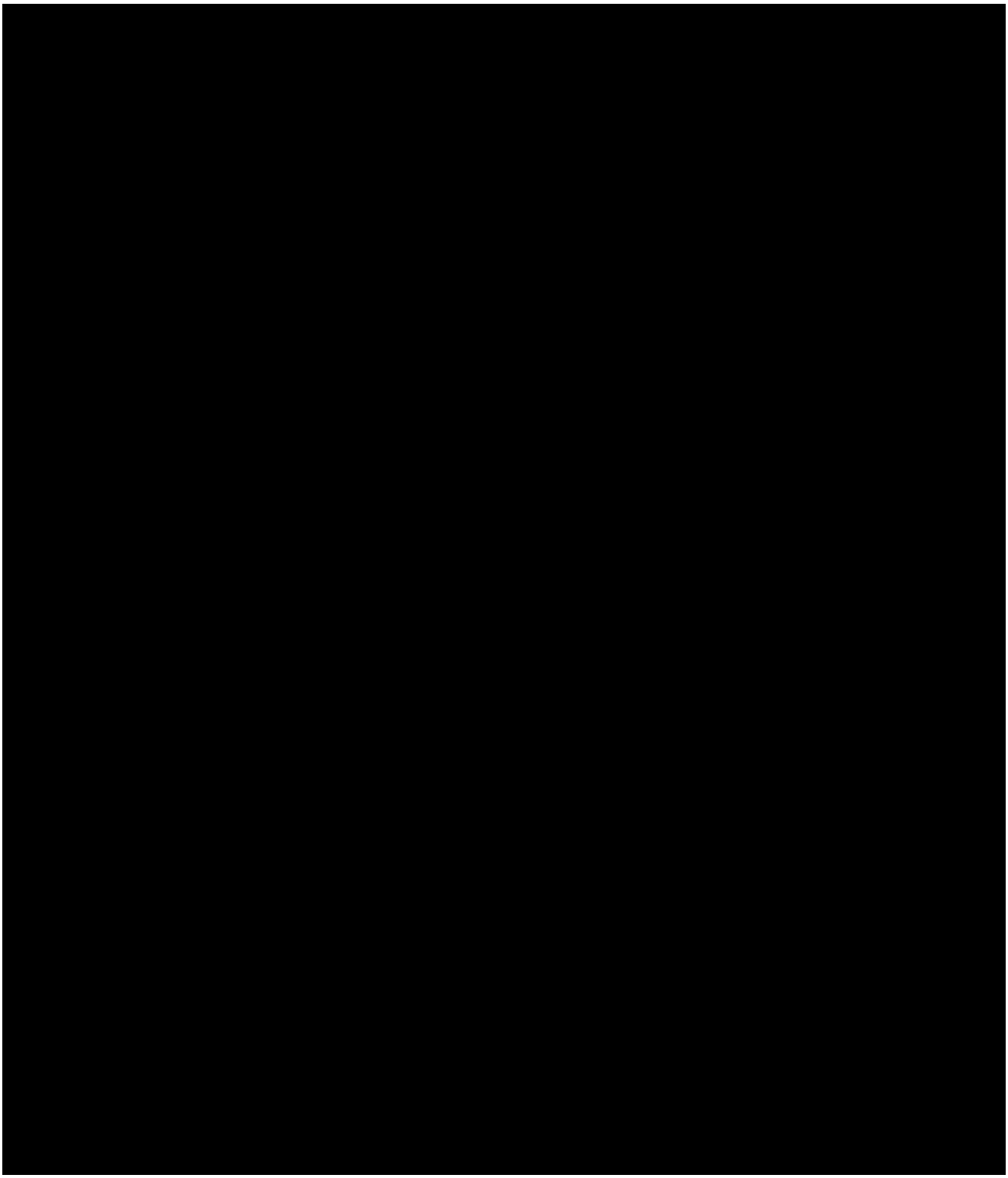
[redacted] The description of this function in both the iFS 2.02.07 and LenSx [redacted] code is: [redacted].[216] The argument list is identical, including the definition of parameter [redacted][217] Notably, the explanatory comments in the functional code are also identical, including comments with unique spacing and punctuation like [redacted], and [redacted].[218] Such idiosyncratic similarities strongly suggest that the code was electronically copied from iFS code to LenSx code. [redacted]

[redacted]

[redacted]

[redacted] The following table reveals the obvious similarity of the code and the explanatory comments:[220]

[redacted]



[redacted]

(b) [redacted]

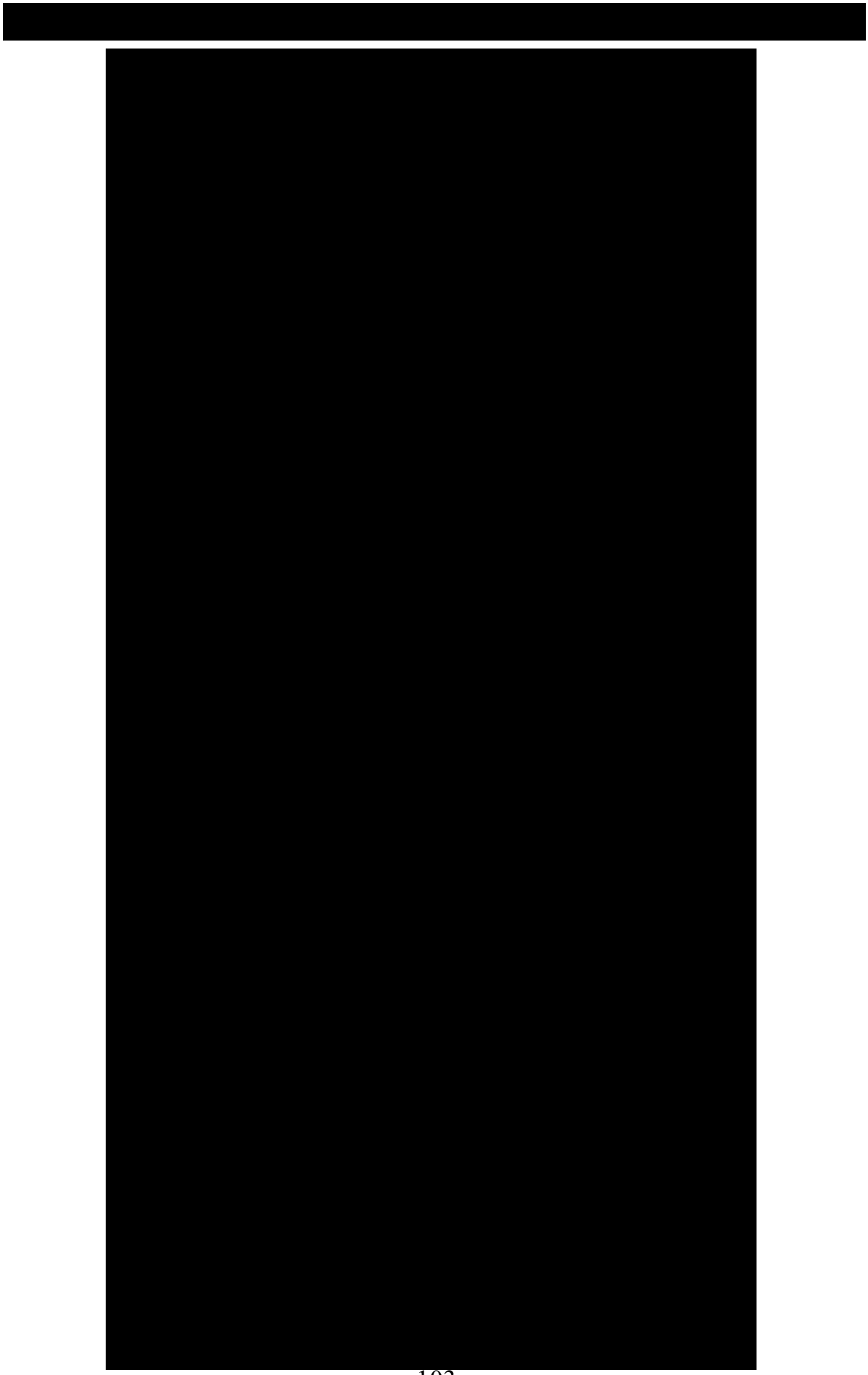
161. The [redacted] functions [redacted] and [redacted] in the [redacted] file in LenSx are also nearly line-for-line identical to the same-named functions in the [redacted] file in iFS, with the sole exception of [redacted] Both files list [redacted] as the "author."[222] The functions' descriptions are identical in both codebases: [redacted][223] Aside from [redacted], the implementing code is identical, as are many explanatory comments in these functions, including [redacted], and [redacted]

[redacted]

[redacted]

[redacted].[224] The following table reveals the obvious similarity of the code and the explanatory comments:[225]

[redacted]



[redacted]

(c) [redacted]

162. [redacted] As explained in paragraph 68 above, the iFS method [redacted] is a unique method of [redacted]. The LenSx code contains the same algorithm, but the corresponding function is named [redacted] instead of [redacted].[226] The LenSx method [redacted] is in the [redacted] file, and the iFS [redacted] method is in the [redacted] file.[227] Both files list [redacted] as the "author" of the file, and the iFS [redacted] file also lists [redacted] as another "author."[228] Both functions have the same description: [redacted][229] Both functions use the same misspelling, [redacted], in the name of the function.[230] Moreover, with the sole exception of [redacted], the implementing code in the

[redacted]

[redacted]

functions is line-for-line identical.[231] Examining the functions in iFS and LenSx reveals the obvious similarities between the function of the code itself, the structure of the operations, and the explanatory headers:[232]

[redacted]

[redacted]

[redacted]

iii. [redacted]

163. Alcon also copied iFS functions that [redacted] For example, the functions [redacted] and [redacted] in the LenSx code are near-identical copies of identically named functions in iFS.[233] The description of the functions are very similar:

[redacted]

164. [redacted]

[redacted]

[redacted]

165. These excerpts of [redacted] in iFS and LenSx reveal the obvious similarities between the function of the code itself, the structure of the operations, and even the spacing and text of the explanatory comments:[238]

[redacted]

[redacted]

166. My time spent with the code so far has been limited. I therefore have not explored in depth the full spectrum of code that guides the movement of the laser. I expect that more in-depth analysis of the code will reveal further similarities and anticipate supplementing my analysis with additional similarities as the case proceeds.

3. Examining the first produced version of the LenSx program confirms that Alcon copied the code from J&J Vision

167. I also reviewed LenSx [redacted] because it appears to be both the earliest version of the LenSx code, and the first version of the LenSx code, produced on the Source Code Laptop.[239] The source code files in LenSx [redacted] appear to contain dates that are closest in time to 2008 and 2009,[240] when I understand Mr. Goldstein and Mr. Vardin started doing work for LenSx Lasers, Inc.[241] LenSx [redacted] is therefore likely to be the version of the LenSx computer program currently available to me that would be most similar to the iFS computer program. In other words, if Alcon made a copy of the iFS code around 2008 or 2009 to kick start development of the LenSx code, and subsequent developers made changes to that codebase over time without further reference to the iFS code, the version of the LenSx computer program closest to 2008 or 2009 is likely to be the most like the iFS computer

[239] *See* ¶¶ 80–84, 87, *supra*.

[240] *Id.*

[241] D.I. 16 ¶ 95.

[redacted]

program. I observed the same types of similarities between iFS 2.02.07 and LenSx [redacted] as I observed between iFS 2.02.07 and LenSx [redacted] (the most recent version). I found that LenSx [redacted] had more similarities to the iFS code than LenSx [redacted]. This finding is consistent with the explanation that Alcon copied the iFS code to build the first versions of the LenSx program, and then over the years continued to add to and modify the iFS code.

168. It is particularly notable that the first version of the LenSx computer program produced by Alcon on the Source Code Laptop includes files and code identical to files and code found in iFS that were never used and were eventually removed from later versions of the LenSx computer program.

169. For example, LenSx [redacted] contains the two files [redacted] and [redacted], both of which are 100% identical to corresponding files in the iFS code.[242] For example, the following table shows the identical headers in [redacted]:[243]

[redacted]

[redacted]

[redacted]

The following table shows the identical headers in [redacted]:[244]

[redacted]

[redacted]

[redacted]

The listed "author" of both [redacted] and [redacted] is [redacted] in both the iFS and LenSx codebases.[245] Moreover, in both codebases, the date listed in the

[redacted]

[redacted]

header of the [redacted] is [redacted], and the date listed in the header of the [redacted].[246] As discussed earlier, these dates are notable because [redacted] LenSx Lasers, Inc. was not founded until 2008.[249] In both codebases, the description in the header of [redacted] is [redacted] and the description in the header of [redacted] is [redacted].[250] [redacted]

170. [redacted]

[redacted]

[redacted]

171. The initial presence and subsequent disappearance of [redacted] that were copied from iFS, alongside the presence of [redacted] that was *not* copied from iFS, indicates that the developers of the LenSx code rushed and indiscriminately copied the entirety of the iFS code into LenSx, without regard to whether they actually needed it. This example also demonstrates that the Alcon developers, over time, changed/removed copied iFS modules that LenSx did not need or use.

172. I also observed evidence that the earlier versions of the LenSx code is more similar to the iFS program than later versions. This finding is consistent with the conclusion that Alcon took the iFS code to develop the first version of the LenSx computer program and then modified it over time. For example, as I discussed above, the functions [redacted] and [redacted] in LenSx [redacted] are extremely similar to the same functions in iFS.[253] The versions of the same functions in LenSx [redacted] are even more similar to the same functions in iFS. Notably, the versions of the same functions in LenSx [redacted] contain function

[redacted]

[redacted]

descriptions, and function calls, that are more similar to the iFS code than LenSx [redacted].[254]

B. Alcon attempted to hide evidence of its copying

173. I performed a limited comparison of different versions of LenSx to observe changes to certain files over time. In doing so, I observed changes that reflect no apparent purpose other than to attempt to hide the true origins of the LenSx code. I describe these changes below. I anticipate that additional examples of Alcon's attempt to hide its copying will be revealed as I have the opportunity to review more LenSx and iFS code.

1. [redacted]

174. iFS 2.02.07 and the first version of LenSx both contain a file called [redacted] which is 100% identical aside from [redacted].[255] The following table displays the obvious similarity between the two versions of the same file:[256]

[redacted]

[redacted]

[redacted]

175. The stated "author" of both files is [redacted], and the date listed in the headers of both files is identical: [redacted].[257] I understand the date stated in the iFS files reflect the date the file was created or modified.[258] As noted above, [redacted] LenSx Lasers, Inc. did not exist until 2008.[260] Moreover, the functional code and all comments are also identical,

[redacted]

[redacted]

down to the spacing of the comments and the description of the file in the header [redacted] [redacted].[261] Such similarities strongly suggest that the code was electronically copied from iFS code to LenSx code.

176. Later versions of the LenSx code contain changes that modify nothing about the function of the code, but do obscure some indications that the code originated from iFS.[262] Specifically, the date in the header of the LenSx file was changed to [redacted], from [redacted] in the first version of [redacted].[263] This change appears to reflect someone's awareness that this code was taken from iFS and that person's belated attempt to hide evidence of the copying. Again, these dates are notable because the date was changed from [redacted], a date *before* LenSx Lasers, Inc. existed, to [redacted], a date *after* its founding in 2008. This lightly modified

[redacted]

[redacted]

version of [redacted] still exists in the current version of the LenSx code.[264] The following figure demonstrates the similarities that remain:[265]

[redacted]

2. [redacted]

177. As another example, iFS 2.02.07 and the first version of LenSx both contain an identical file named [redacted][266] The description of both files is [redacted], and both files list [redacted] as

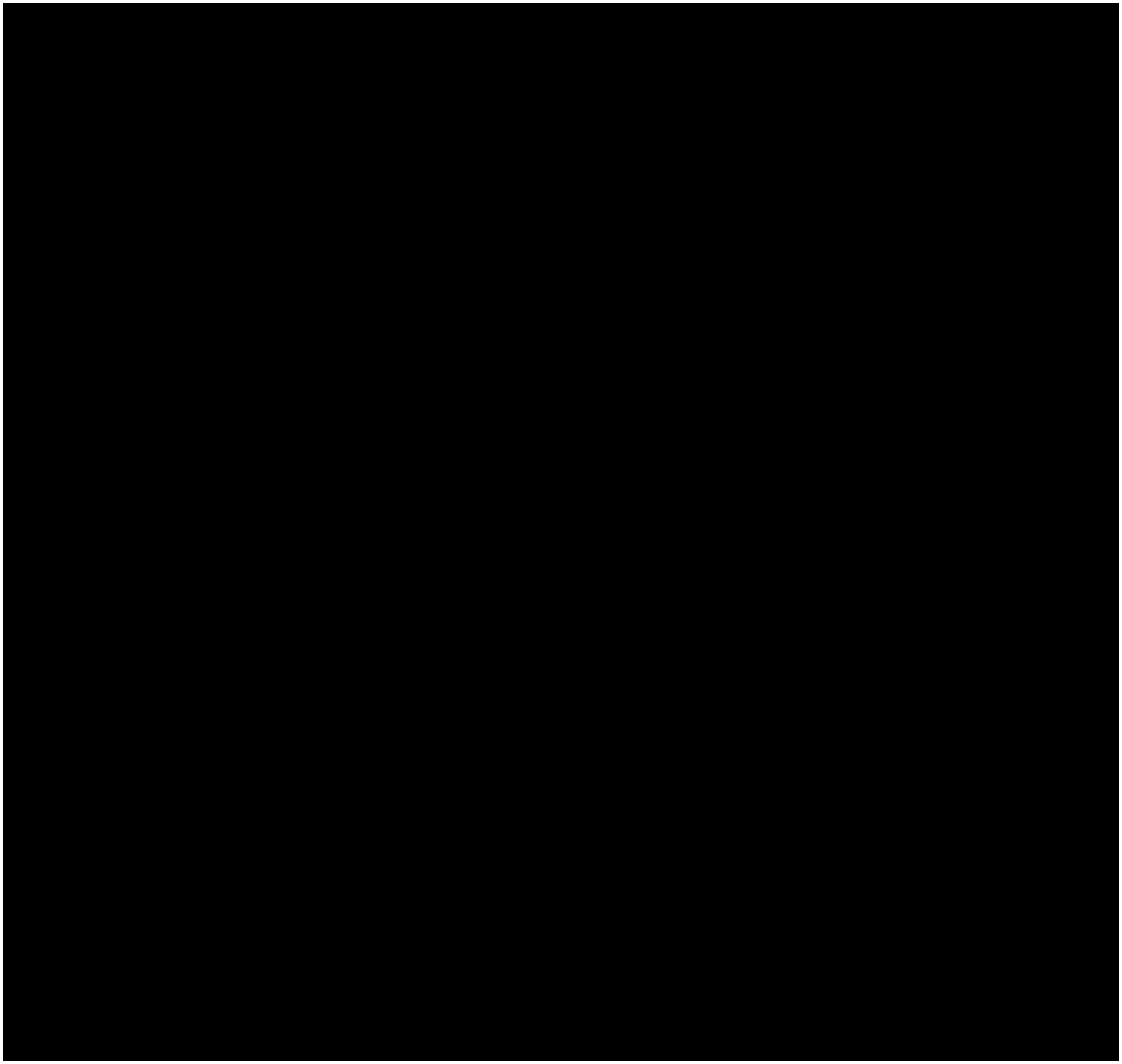
[redacted]

[redacted]

the "author."[267] Both files also list [redacted] as the date in the header of the file,[268] which again is a date [redacted] before LenSx Lasers, Inc. was founded.[269] The following table shows an excerpt of the identical code:[270]

[redacted]

[redacted]



178. All variables, definitions, and comments in this file are precisely identical, down to the spacing of the comments and the spelling errors [redacted] Such similarities strongly suggest that the code was electronically copied from iFS code to LenSx code. Also notable is that the header for both files contains a notation for a revision [redacted] which

[redacted].[271] As explained in paragraphs 81–84 above, it does not appear that there was ever a version [redacted] of the LenSx code, but there was a version [redacted] of the iFS code.

179. The [redacted] file was removed entirely from later versions of LenSx.[272] Similar to [redacted] discussed in paragraphs 169–171 above, it appears that LenSx did not use the code in [redacted] but failed to remove this iFS file from its codebase until [redacted].

180. Taken together, these changes—*i.e.*, examples of modifications that Alcon made over time to the LenSx codebase—appear to reflect an acknowledgement on the part of the Alcon developers that the LenSx computer program was based on code taken from the iFS computer program and demonstrated an intentional effort on the part of the developers to remove evidence of that theft from the LenSx codebase without actually removing the iFS code itself.

181. In summary, the copying of iFS code by Alcon I have found during my preliminary review of the code is substantial both in the volume and the importance of the code and other elements taken. Those copied elements—including both the lines of code itself and the overall structure and arrangement of the program—are

[redacted]

[redacted]

integral to the LenSx software as it exists today. Simply put, the LenSx program cannot operate without the copied iFS code.

[redacted]

I declare under penalty of perjury that the foregoing is true and correct.

Executed on February 4, 2021
in Nashville, TN.

Dr. Douglas Schmidt